

WHAT IS CLAIMED IS:

1. A method for creating a substantially single and continuous fracture in soil at a selected location of variable depth and area, and filling the fracture with a fluid material to form, *in situ*, a layer of material in the fracture that can be used for various purposes,
5 said method comprising the steps of;

a) Application of means to create a stress concentration cavity at a specific location in soil, said stress concentration cavity to be constructed and aligned such that when a pressure is applied to said cavity, the soil will fracture in a predetermined location and direction;

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b) Creation of multiple stress concentration cavities in the soil throughout an area or control zone to be fractured, said cavities to be located where the fracture is to occur and where the layer of material is to be formed, said stress concentration cavities to be spaced and aligned such that when the soil is
15 pressurized and stressed at each said cavity, the soil will fracture toward the adjacent stress concentration cavities;

c) Application of means to limit the travel of the planned fracture if desired, and prevents the fracture from traveling far outside a control zone;

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d) Application of means to synchronously pressurize all stress concentrations cavities with a gaseous fracture fluid so that a fracture is initiated in each stress concentration cavity at substantially the same time, said fracture propagating toward and connecting with the adjacent stress concentration cavities, said
25 fracture fluid injection resulting in forming a substantially single and continuous fracture throughout the planned location of the fracture, said fracture fluid

injection continuing until said fracture fluid escapes from the boundary of a control zone;

5 e) Application of means to inject fluid material into the stress concentration cavities causing said fluid material to flow along the fracture plane, said fluid material solidifying or setting to form the desired layer of material that can function as needed at the planned location.

2. Apparatus for creating a substantially single and continuous fracture in soil at a
10 selected location of variable depth and area, and filling the fracture with a fluid material to form *in situ*, a layer of material in the fracture that can be used for various purposes, said apparatus comprising;

- 15 a) Installation of a conduit into soil to the depth of the desired subsurface fracture, said conduit being sealed to the soil by compaction;
- b) Creation of a flattened and generally circular cavity such as an ellipsoid in the soil at the bottom of said conduit, said cavity causing stress concentrations in the soil at the outer boundaries of its major axes, said stress concentration cavity to have its major axes aligned with the planned path of said fracture, said
20 stress concentration cavity causing initial soil fracture to occur radially outward from the major axes when said cavity is subjected to adequate pressure;
- c) Installation of a plurality of conduits within a control zone where the fracture is to be located, and formation of said stress concentration cavities at the bottom
25 of each conduit, said conduits and stress concentration cavities to be spaced and aligned with the planned path of the fracture;

d) Installations of means to limit the travel of the planned fracture if desired, and prevent the fracture from traveling far out side a control zone, said means including vent hole or subsurface walls;

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e) Provide an air pressure source with automatic controls for each conduit, said control system to provide for synchronous injection of air into the stress concentration cavities by way of the conduits, said pressure source being adequate to rapidly fracture the whole area surrounding each stress concentration cavity;

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f) Operate automatic air injection system to synchronously inject air into each stress concentration cavity, said air pressure and volume being adequate to cause rapid soil fracture at all of the stress concentration cavities at about the same time and cause propagation of the fracture radially outward towards the adjacent cavities, said fractures connecting with each other and forming a substantially single and continuous fracture in the soil at the planned location, said air injection continuing until said air escapes from the boundary of the control zone;

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g) Injection of a fluid material into the conduits and hence into the stress concentration cavities such that said fluid material will flow along the path of the soil fracture and fill the fracture, said fluid material solidifying and forming a layer of material that can be used for various purposes, said fluid material injection volume to be sufficient to produce a layer of material of the desired area and thickness.

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